

## Earthquake Testing

During NASA's Apollo program, it was necessary to subject the mammoth Saturn V launch vehicle to extremely forceful vibrations to assure the moonbooster's structural integrity in flight. Marshall Space Flight Center assigned vibration testing to a contractor, the Scientific Services and Systems Group of Wyle Laboratories, Norco, California. Wyle-3S, as the group is known, built a large facility at Huntsville, Alabama, and equipped it with an enormously forceful shock and vibration system to simulate the liftoff stresses the Saturn V would encounter.

Saturn V is no longer in service, but Wyle-3S has found spinoff utility for its vibration facility. It is now being used to simulate earthquake effects on various kinds of equipment, principally equipment intended for use in nuclear power generation. Government regulations require that such equipment demonstrate its ability to survive earthquake conditions. In upper left photo, Wyle-3S is preparing to conduct an earthquake test on a 25-ton diesel generator built by Atlas Polar Company, Ltd., Toronto, Canada, for emergency use in a Canadian nuclear power plant. Being readied for test in the lower left photo is a large circuit breaker to be used by Duke Power Company, Charlotte, North Carolina. Electro-hydraulic and electro-dynamic shakers in and around the pit simulate earthquake forces.

Wyle-3S has had extensive aerospace research experience and has been particularly successful in developing spinoff applications. In addition to earthquake testing, the company has adapted its shaking technology to simulation of dynamic transportation environments, in order to evaluate effects on such equipment as railway cars, rail or road-transported cargo, and truck refrigeration units. A variation of this technology provides a non-destructive method of testing highway pavements.

In its work for NASA, Wyle-3S also developed technology for data acquisition and processing systems. A number of spinoff applications have

evolved from this experience. Examples include systems for processing data to evaluate solar heating and cooling equipment and microprocessors for recording data on aircraft, auto and truck noise. Another example of how this technology is being applied is illustrated in the photo below. The boat pictured is equipped with a portable microprocessor system which records data on the performance of pleasure boat operators and how they are affected by noise, fatigue and other environmental and psychological factors. The tests are being conducted by Wyle-3S for the U.S. Coast Guard as part of a program designed to improve boating safety.

